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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,930	03/16/2004	Severine Catreux	16136US02	4709

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EXAMINER	
VLAHOS, SOPHIA	
ART UNIT	PAPER NUMBER
2611	
MAIL DATE	DELIVERY MODE
12/28/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/801,930	CATREUX ET AL.	
	Examiner	Art Unit	
	SOPHIA VLAHOS	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7-9,11-13,19-21,23,24,33-35,37-39,41,42 and 44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *7-9,11-13,19-21,23,24 and 44* is/are allowed.

6)☒ Claim(s) *33,34,37-39 and 42* is/are rejected.

7)☒ Claim(s) *35 and 41* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 June 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114 was filed in this application after appeal to the Board of Patent Appeals and Interferences, but prior to a decision on the appeal. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 11/30/2009 has been entered.

Claim Objections

2. Claims 19, 37 objected to because of the following informalities:

Claim 37, lines 3-4 recite: "to the upconverter", however there is no previous reference to an upconverter.

Claim 19, line 6 recites: "provision to the upconvert" however there is no previous reference to an upconverter.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to

be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 33, 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Foschini et al. (U.S. 6,888,809) in view of Whinnett (U.S. 6,192,256) and Chun et al. (U.S. 7,079,867).

With respect to claim 37, Foschini et al. disclose: a baseband processing network configured to perform a weighting and combining operation of demultiplexed signals prior to provision to the upconverter (Fig. 1, demux outputs 101, column 35-39, weights out of weight supplier 105 supplied to blocks 103-1 through 103-N, and adder 111-1 combined said weighted demultiplexed signals, column 3, lines 54-59, 66-67 column 4, lines 1-4); an upconverter configured to upconvert an input signal into an input RF signal (Fig. 1, blocks 117-1 through 117-N considered as a whole to correspond to an upconverter, column 4, lines 12-16, receive parallel input signal and output a parallel RF output signal).

Foschini et al. do not expressly disclose: an RF processing network configured to perform a weighting operation in the RF domain upon said RF signal to produce a first plurality of RF signals capable of being transmitted by an antenna structure, wherein RF processing network performs the weighting operation using weights that are obtained from an eigenvector corresponding to a largest eigenvalue of a cross-correlation matrix.

In the same field of endeavor, Whinnett discloses: an RF processing network configured to perform a weighting operation in the RF domain upon said RF signal to produce a first plurality of RF signals capable of being transmitted by

an antenna structure, wherein RF processing network performs the weighting operation using weights (Fig. 7, transmit side 708, performing a weighting operation in the RF domain (gain in the RF domain is adjusted by variable gain amplifiers 758, 759, 760 which is determine by blocks 752 and 756 for the three antenna, antenna structure, column 11, lines 4-26, column 47-67).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Foschini et al. based on Whinnett to maximize received amplitude power or maximize the ratio off wanted signal to interference plus noise at the receiver (Whinnett, column 12, lines 35-48).

Neither Foschini et al. nor Whinnett expressly disclose: weights that are obtained from an eigenvector corresponding to a largest eigenvalue of a cross-correlation matrix.

In the same field of endeavor, Chun et al. disclose: weights that are obtained from an eigenvector corresponding to a largest eigenvalue of a cross-correlation matrix (column 9, lines 9-40 where the optimum weight vector for forming a forward beam (i.e. transmission) is calculated based on an eigenvector and maximum eigenvalue of a cross correlation matrix $H^{H}H$ (Chun et al. identify $H^{H}H$ as a correlation matrix however a person of ordinary skill in the art would have recognized the matrix as cross correlation matrix).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Foschini et al. and Whinnett based on Chun et al. so that an optimal weight vector is computed which maximizes SNR at the receiver (Chun et al. column 9, lines 8-24).

Claim 33 is rejected based on a rationale similar to the one used to reject claim 37 above

5. Claims 34 , 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Foschini et al. (U.S. 6,888,809) in view of Whinnett (U.S. . 6,192,256) and Chun et al. (U.S. 7,079,867) and further in view of Kanai (U.S. 5,719,583).

With respect to claim 38 neither Foschini et al. nor Whinnett et al. or Chun et al. expressly disclose: wherein said RF processing network includes an arrangement of dividing element configured to divide said input RF signal into a plurality of divided RF signals.

In the same field of endeavor, Kanai et al. disclose: an RF processing network includes an arrangement of dividing element configured to divide input RF signal into a plurality of divided RF signals (Fig. 1, combination of blocks 12 and weighting circuit 11 for the communication channel, see plurality of divided Radio transmission signals weighted by the weighting circuit 11, column 3, lines 15-36).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Foschini et al. based on Kanai et al. to adjust antenna directivity to allow a predetermined signal quality under the condition of a calculated propagation loss (Kanai et al column 4, lines 22-54).

Claim 34 is rejected based on a rationale similar to the one used to reject claim 38 above.

With respect to claim 39, the system obtained by modifying Foschini et al. based on Whinnett, Chun and Kanai further discloses: wherein said RF processing network further includes an arrangement of weighting elements configured to weight said first plurality of divided RF signals to from said first plurality of RF signals (weighting circuit 11 of Kanai et al. and weighting elements of Whinnett)

With respect to claim 42, the system obtained by modifying Foschini et al. based on Whinnett, Chun and Kanai further discloses: wherein values of said weighting elements are selected to maximize an output signal-noise ratio of a receiver disposed to receive said first plurality of RF signals (Whinnett column 12, lines 41-47).

Allowable Subject Matter

6. Claims 7-9, 11-13, 19-21, 23-24,44 are allowable over the prior art of the record.

Claims 35, 41 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Raleigh et al. (U.S. 6,452,981)

Kohno (U.S. 7,110,468)

Sampath (U.S. 2003/0043929)

Li et al. (U.S. 6,721,339)

Lo et al. (U.S. 6,016,124)

Lozano et al. (U.S. 6,778,612)

Ogawa et al. (U.S. 6,590,532)

Espax et al. (U.S. 6,373,433)

Hottinen (U.S. 7,236,537)

Tesfai et al. (U.S. 6,873,651)

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SOPHIA VLAHOS whose telephone number is (571)272-5507. The examiner can normally be reached on MTWRF 8:30-17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 571 272 3021.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SOPHIA VLAHOS/
Examiner, Art Unit 2611
12/17/2009

/Mohammad H Ghayour/
Supervisory Patent Examiner, Art Unit 2611